## REMARKS

Claim 19 has been amended. Claims 22, 23, 25, 27, and 30 all depend from independent amended Claim 19. New claims 32-37 have been added. As a result, Claims 19, 22, 23, 25, 27, 30, and 32-37 are now pending in this application. Support for the amendments to Claim 19 can be found throughout Applicant's specification. In particular, support is found at page 7, lines 23-28, and page 9, lines 25-31. Support for the new claims can be found in the Applicant's specification at least at: page 7, lines 24-26; page 9, lines 1-4; page 12, line 23 - page 13, line 11; page 14, line 27 - page 15, line 6; and page 16, lines 20-27. While no language in the specification specifically identifies the "compression ratio sufficient to produce a supersonic exhaust", one skilled in the art would readily appreciate that a supersonic engine must have at least a compression ratio sufficient to produce a supersonic exhaust.

Reconsideration of the patentability of the claims in view of the foregoing amendments and the following remarks is respectfully requested.

### Rejection Over Wolf et al. or Hazen et al.

Examiner rejected claims 19, 22, 23, 25, 27, and 30 as being anticipated by either Wolf et al. or Hazen et al. Independent claim 19 has been amended from which Claims 22, 23, 25, 27 and 30 depend. In addition, new claims 32-37 have been added which overcome the Examiner's rejection. Independent Claims 19 and 32 recite specific limitations clearly not present in either Wolf et al or Hazen et al.



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The inventive configuration of the present engine creates a heated exterior subsonic stream of exhaust gases or air which at least partially envelopes a supersonic stream of exhaust gases. The claims are directed to a supersonic aircraft engine which, while in use, creates at least a multiple stream exhaust profile. The multiple stream exhaust profile can significantly reduce the noise of a supersonic center exhaust stream if the difference in the flow rates of adjacent streams of the exhaust is less than the speed of sound at the temperature of the slower exhaust stream. More succinctly put, the sound associated with a supersonic stream is significantly reduced or eliminated if the second stream satisfies the following conditions:

> the difference in air velocity between the interior or first stream of air and the exterior or second stream is less than the speed of sound in the exterior or second stream; and
>
> the difference in air velocity between the exterior or second stream and the ambient air flow surrounding the second stream is less than the speed of sound in the surrounding ambient air flow.

Thus, the creation and use of the multiple stream exhaust profile effectively reduces or eliminates the noise created by the transitions between supersonic and subsonic flows. The present claimed invention innovatively produces the required multiple stream exhaust profile in a supersonic aircraft engine with the claimed structure.

Wolf et al.

While the Examiner is correct that the Wolf et al. patent includes a combustion chamber in the bypass duct (Col. 2, Lines 41-44), the Wolf et al. patent does not teach or disclose the creation of a multiple stream exhaust profile having a supersonic layer enveloped by a subsonic layer. The innovative exhaust stream of the present invention is created by the specific configuration of the claimed invention which includes a compression ratio sufficient to produce supersonic exhaust. Specifically, the structure of the combustion chamber in Claim 19 expels supersonic exhaust, which is unlike the structure of Wolf et al. The subsonic exhaust emitted by the heating mechanism of Claim 19 is in direct contact with the supersonic exhaust. Thus, the supersonic exhaust is advantageously enveloped by the subsonic exhaust through use of the claimed structure of Claim 19. Nothing in Wolf et al. would even suggest such an arrangement.

In Claim 32, a supersonic jet engine in use is claimed. The supersonic combustion chamber is in fluid communication with the first passage. The first passage emits a supersonic thrust and accompanying supersonic exhaust stream. The supersonic exhaust stream of Claim 32 is in direct contact with a subsonic exhaust stream which is emitted from the second passage. The second passage is in fluid communication with the heating mechanism. Again, the supersonic exhaust is advantageously enveloped by the subsonic exhaust through use of the claimed structure of Claim 32.

While Wolf et al. teaches the use of combustion chambers in the bypass merely to augment the core thrust (Col. 3, Lines 33-36), Wolf et al. contains no teaching or disclosure

directed to a core supersonic thrust without the need for augmentation by combustion chambers in the bypass. Thus, there is no supersonic core stream surrounded by a subsonic stream created by the bypass combustion chambers in Wolf et al. Indeed, Wolf et al. does not disclose any aspects relating to supersonic flows and related thrusts as required by the claims of the present invention.

Hazen et al.

The Examiner cites the Hazen et al. patent as an alternative basis for rejection. The Hazen patent does not teach or disclose the creation of a multiple stream exhaust profile having a supersonic layer enveloped by a subsonic layer as discussed above. Again, the Hazen et al. patent discloses the use of combustion chambers in the bypass layer merely to augment the core thrust (Col. 1, Lines 36-39; Col. 2, Lines 44-46; Col. 3, Lines 26-28). Hazen et al. does not teach a supersonic thrust which is enveloped in a subsonic thrust. In addition, Hazen et al. does not disclose the use of a compression ratio sufficient to produce supersonic exhaust. Importantly, Hazen et al. also does not teach any aspects relating to supersonic flows and related thrusts as required by the claims of the present application. Thus, Hazen does not even provide a suggestion of the claimed structures.

Operational Language

The Examiner based his rejections on the assertion that certain limitations of the claims merely constituted an intended mode of operation and/or a desired result. The

rejection was based on language in previously pending Claim 19 describing two exhaust streams as having different temperatures and the result of preventing Mach waves. Claim 19 has been amended to remove the language objected to by the Examiner and new claim 32 omits the language objected to by the Examiner.

The language in prior Claim 19 describing two exhaust streams as having different temperatures and the result of preventing Mach waves has been removed from Claim 19. Claim 19 now claims an engine having a structure adapted to provide a compression ratio sufficient to produce a supersonic exhaust, and a combustion chamber and heating mechanism combination capable of producing a multiple layer exhaust profile. The exhaust stream has a supersonic layer produced by the combustion chamber on one side of the partition. The supersonic layer is in direct contact with a subsonic layer produced by the heating mechanism on the other side of the partition. The claimed structure adapted to provide a compression ratio sufficient to produce a supersonic exhaust, and combustion chamber and heating mechanism separated by the partition create the specific structure claimed which renders the present invention capable of operating differently than the prior art. Thus, the limitations recited in presently pending Claim 19 recite a different structure than that disclosed in the prior art.

Claim 32 claims an engine in use having a combustion chamber and heating mechanism combination which produce a multiple stream exhaust profile. The exhaust stream is explicitly recited in the claim and has a supersonic stream of exhaust produced by the combustion chamber which is in fluid communication with the first passage. The

supersonic stream is in direct contact with a subsonic stream produced by the heating mechanism which is in fluid communication with the second passage. The claimed compression ratio sufficient to create a supersonic exhaust, combustion chamber, heating mechanism and the passages create the specific structure claimed which renders the present invention capable of operating differently than the prior art.

Conclusion

In view of the amendments and the foregoing remarks, the present application is submitted as fully in condition for allowance. Should the Examiner have any remaining objections which would impede allowance, the Examiner is respectfully invited to contact the undersigned at the telephone number appearing below.

Respectfully submitted,

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